National Institute of Environmental Health Sciences

Predicting the start week of respiratory syncytial virus outbreaks using real time weather variables

Author(s): Walton NA, Poynton MR, Gesteland PH, Maloney C, Staes C, Facelli JC
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Abstract:

BACKGROUND: Respiratory Syncytial Virus (RSV), a major cause of bronchiolitis, has a large impact on the census of pediatric hospitals during outbreak seasons. Reliable prediction of the week these outbreaks will start, based on readily available data, could help pediatric hospitals better prepare for large outbreaks. METHODS: Naive Bayes (NB) classifier models were constructed using weather data from 1985-2008 considering only variables that are available in real time and that could be used to forecast the week in which an RSV outbreak will occur in Salt Lake County, Utah. Outbreak start dates were determined by a panel of experts using 32,509 records with ICD-9 coded RSV and bronchiolitis diagnoses from Intermountain Healthcare hospitals and clinics for the RSV seasons from 1985 to 2008. RESULTS: NB models predicted RSV outbreaks up to 3 weeks in advance with an estimated sensitivity of up to 67% and estimated specificities as high as 94% to 100%. Temperature and wind speed were the best overall predictors, but other weather variables also showed relevance depending on how far in advance the predictions were made. The weather conditions predictive of an RSV outbreak in our study were similar to those that lead to temperature inversions in the Salt Lake Valley. CONCLUSIONS: We demonstrate that Naive Bayes (NB) classifier models based on weather data available in real time have the potential to be used as effective predictive models. These models may be able to predict the week that an RSV outbreak will occur with clinical relevance. Their clinical usefulness will be field tested during the next five years.

Source: http://www.ncbi.nlm.nih.gov/pmc/articles/PMC2987968

Resource Description

Communication:

resource focus on research or methods on how to communicate or frame issues on climate change; surveys of attitudes, knowledge, beliefs about climate change

A focus of content

Communication Audience:

audience to whom the resource is directed

Health Professional

Exposure :

weather or climate related pathway by which climate change affects health

Air Pollution, Meteorological Factors, Temperature

Air Pollution: Interaction with Temperature

Temperature: Fluctuations

Geographic Feature: ☑

resource focuses on specific type of geography

None or Unspecified

Geographic Location: ☑

resource focuses on specific location

United States

Health Impact: ☑

specification of health effect or disease related to climate change exposure

Infectious Disease

Infectious Disease: Airborne Disease

Airborne Disease: Respiratory Synctial Virus (RSV)

Mitigation/Adaptation: ☑

mitigation or adaptation strategy is a focus of resource

Adaptation

Model/Methodology: ☑

type of model used or methodology development is a focus of resource

Methodology

Resource Type: ☑

format or standard characteristic of resource

Research Article

Timescale: ☑

time period studied

Time Scale Unspecified

Vulnerability/Impact Assessment: ☑

resource focus on process of identifying, quantifying, and prioritizing vulnerabilities in a system

A focus of content